



**DEPARTMENT OF ENERGY
Nevada Operations Office
Las Vegas, NV**

**DOE ORDER 232.1
TRENDING & ANALYSIS
REPORT**

Third Quarter

1997

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INTRODUCTION

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This Department of Energy, Nevada Operations Office (DOE/NV) Quarterly Trending & Analysis Report (QT&AR) covers the third quarter of 1997. The DOE/NV QT&AR includes data from the Occurrence Reporting and Processing System (ORPS) calendar quarter, which ended September 30, 1997.

The DOE/NV QT&AR is based on DOE/NV ORPS reports issued under DOE Order 232.1, *Occurrence Reporting and Processing of Operations Information* and its earlier versions. This report consists of a management summary and statistical data on occurrences reported by DOE/NV and its contractors/users. Also, included are items of interest from events occurring at other DOE locations.

Not all of the eleven active DOE/NV contractors/users registered in ORPS as Facility Managers (FMs) for DOE/NV's thirty-eight active facilities, will appear in this report. The QT&AR includes only the DOE/NV contractors/users who submitted occurrence reports in ORPS.

The abbreviations (recognized by ORPS) for the DOE/NV contractors/users appearing in this report follow:

BNLV	Bechtel Nevada
DSWA	Defense Special Weapons Agency
GONV	Nevada Operations Office
ITNV	IT Corporation
LANV	Los Alamos National Laboratory - Nevada
LLNV	Lawrence Livermore National Laboratory - Nevada
SDNL	Sandia National Laboratory, Nevada
WSIN	Wackenhut Services, Inc.

INTRODUCTION

ORPS OCCURRENCE REPORT CHANGE POLICY **an excerpt from the July 1997 ORPS Bulletin**

This article updates the information provided in the December 1994 ORPS Bulletin describing the DOE policy for making changes to occurrence reports that have already been transmitted to the ORPS database. The general policy is that ORPS Technical Support personnel will only make changes to reports already on the database if the Facility Manager (including Designees) or Administrator cannot make the changes themselves. The types of changes that they are unable to make are small in number, since the Facility Manager or Administrator can, in one way or another, make changes to most of the data fields.

Facility Managers or Administrators can usually submit an Update Report to correct errors in Notification or Update Reports. In addition, Facility Managers or Administrators can get changes made to Pre-Final Reports by requesting the DOE Facility Representative or DOE/HQ Program Manager to reject the report. After rejection, the Facility Manager or Administrator can then make the correction(s) to the report and transmit it again to the host computer.

In cases where the Facility Manager or Administrator cannot access a field or the report is already final, the ORPS Technical Support personnel may be requested to make the change(s). For these cases only, the requests must be sent to ORPS Technical Support at fax number (208) 523-9920 or E-mail **support@tis.eh.doe.gov**. In addition, copies of the request must be sent to Eugenia Boyle at fax number (301) 903-2329 or E-mail **Eugenia.Boyle@eh.doe.gov** and to Elizabeth Beavers at fax number (301) 903-0118 or E-mail **Elizabeth.Beavers@eh.doe.gov**.

ORPS Technical Support personnel can be requested to make changes to the Notification, Update, Update/Final, and Final Reports to:

- Change report transmittal and signature dates if and only if the delay was due to host computer downtime or problems. It should be noted that a transmittal date will not be backdated because the report was not submitted on time due to lack of training and/or appropriate software/hardware.
- Change existing occurrence report numbers due to changes in facility names or boundaries. This could be required because of contractor or organizational changes.

INTRODUCTION

In addition, the ORPS Technical Support personnel can be requested to change:

- The discovery and categorization date and/or time for Notification/Update Reports, if needed. If the current report is an Update Report, the modification will also be made to the historical Notification Report.
- The DOE Program Office designation to help in the sign-off of a Pre-Final Report. The Program Office code and description will be modified only on the Pre-Final Report.
- Incorrect corrective action completion dates entered on the Final Report. This change requires modifying or deleting the specified corrective action completion date(s) and requires a written request with signatures from the Facility Manager, DOE Facility Representative, and DOE/HQ Program Manager.
- Any field on a Final Report, including but not limited to the Number of Occurrence field in a Roll-Up Report. The ORPS Technical Support personnel must receive a written request signed by the Facility Manager, DOE Facility Representative, and DOE/HQ Program Manager.

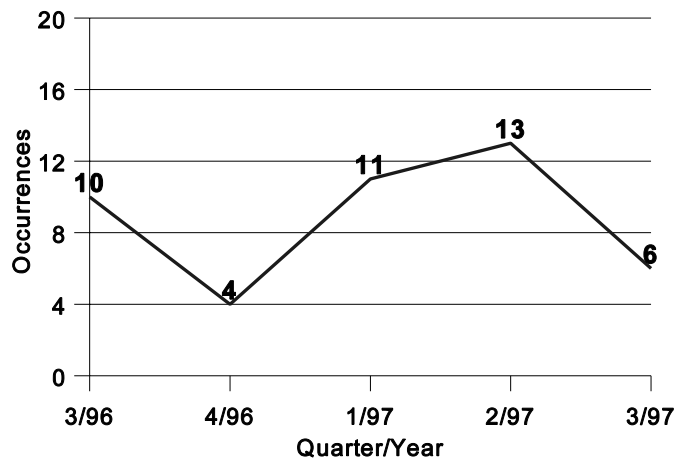
MANAGEMENT SUMMARY

MANAGEMENT SUMMARY

This section summarizes general trends, observations, and lessons learned during the compilation, evaluation, and reporting of occurrences for this quarter. Based on the occurrence discovery date, ORPS identified six new reports this quarter.

Occurrence Distribution

July 1, 1996 to September 30, 1997



Occurrences by Contractor August 1, 1990 to September 30, 1997

Contractor	BNLV	DSWA	GONV	ITNV	LANV	LLNV	SDNL	WSIN
Total	33	2	8	1	4	14	7	73
Quarter	2	0	0	0	0	0	1	3

MANAGEMENT SUMMARY

Emergency

DOE/NV has never categorized an event as an "Emergency" since the start of ORPS.

Unusual Occurrence

DOE/NV categorized three events as Unusual Occurrences (UOs) this quarter. All three were reported under the Safeguards/Security ORPS reporting area.

DOE/NV has reported 62 occurrences as UOs since the start of ORPS. They reported them under the following ORPS reporting areas: Safeguards/Security (55%), Environmental (20%), Facility Condition (10%), Personnel Safety (8%), Facility Status (3%), Value Basis Reporting (2%), and Cross-Category Items (2%).

Off-Normal Occurrence

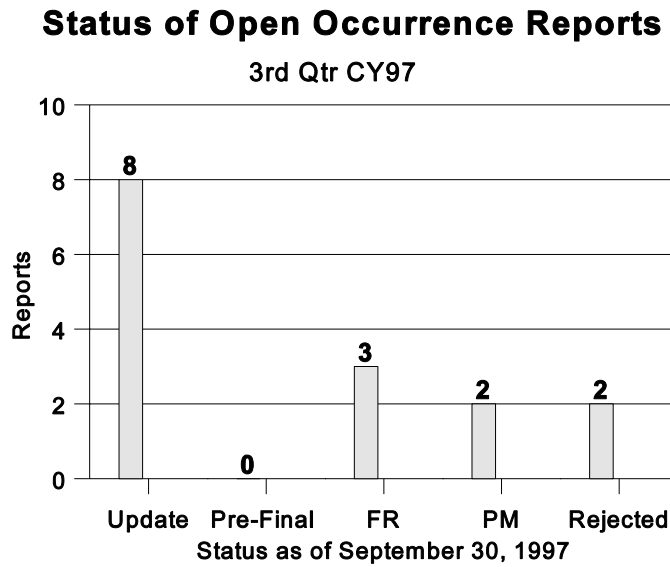
DOE/NV categorized three events as Off-Normal Occurrences (ONs) this quarter. They reported them under the following ORPS reporting areas: two under Personnel Safety and one under Value Basis Reporting. Note that occurrences may be categorized under more than one reporting area.

DOE/NV has reported 614 occurrences as ONs since the start of ORPS. They reported them under the following ORPS reporting areas: Facility Condition (31%), Environmental (21%), Personnel Safety (15%), Safeguards/Security (10%), Cross-Category Items (10%), Personnel Radiation Protection (5%), Value Basis Reporting (4%), Transportation (2%), Facility Status (1%), and Nuclear Explosive Safety (1%).

TRENDING AND ANALYSIS

TRENDING AND ANALYSIS

Since the start of ORPS, DOE/NV has reported 676 occurrence reports. As of September 30, 1997, 661 occurrence reports have been completed. Of the fifteen reports that remain open, thirteen are being completed and two have been rejected pending further action.

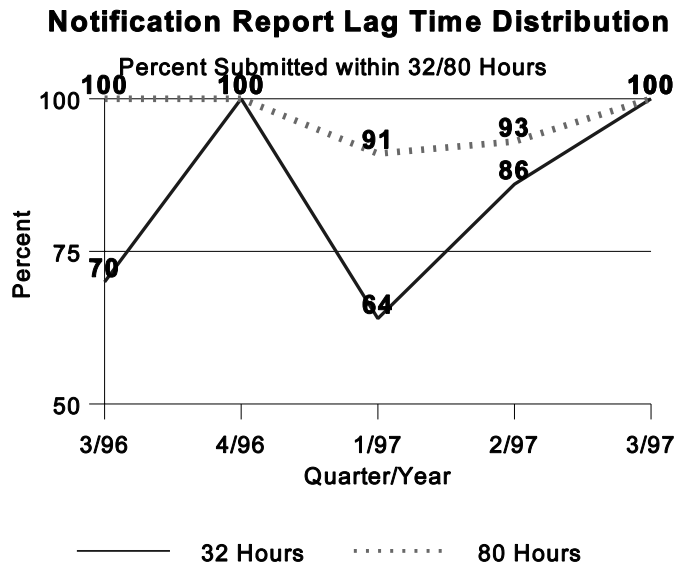


REPORT TIMELINESS

REPORT TIMELINESS

Notification Reports

DOE Order 232.1 requires submittal of a Notification Occurrence Report (NOR) within 80 hours of the time of categorization. DOE/NV submitted 100% percent by the close of the next business day and 100% within the 80-hour criterion this quarter.



Notification Report Lag Time 3rd Qtr CY97

Hours	0 - 5	6 - 10	11 - 15	16 - 20	21 - 25	26 - 30	30+
Reports	4	0	0	0	1	1	0

Update Reports

The FM submits an Update Occurrence Report (UOR) when significant and new information is available or upon request by DOE/NV. They will submit a UOR within 45 days after categorization if the required analysis of an event cannot be completed.

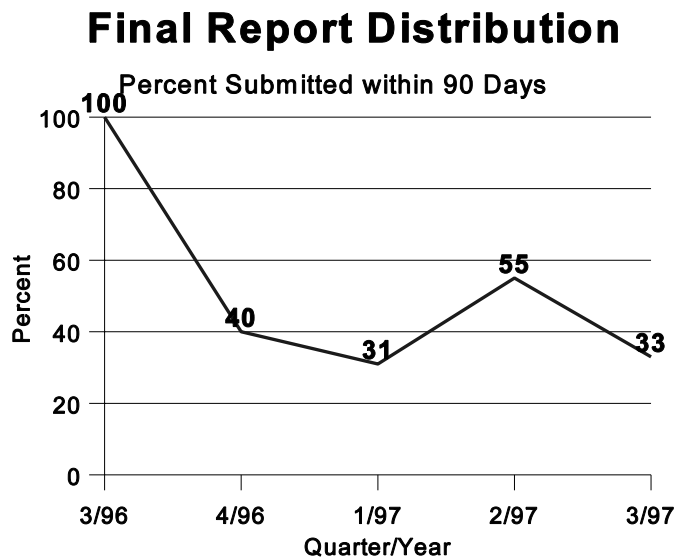
REPORT TIMELINESS

The report will explain the delay and provide an estimated date for submittal of the Final Occurrence Report (FOR).

Final Reports

The FM completes an FOR and submits the FOR to the FR as soon as practical, but within 45 calendar days after categorization. The FR will review, approve, add any comments, and forward the FOR to the PM within 10 calendar days of receipt. The PM will review, approve, and add any comments to the FOR within 14 days of receipt. If either the FR or the PM has not approved the FOR, they will return it to the FM with an explanation for the disapproval. An FOR is considered final when the FM, FR, and/or PM have all approved and signed the report.

DOE Order 232.1 establishes a 45-calendar-day criterion for completion of FORs by the FM. DOE/HQ established an internal goal that 90% of reports should meet the 45-day criteria. The QT&AR follows that criterion here for comparison purposes. Analysis of data for this quarter shows a percentage decrease from a year ago and a percentage decrease from the preceding quarter. During this quarter, nine FORs were submitted with an average lag time of 79 days. Three of the FORs met the 90-day criterion and three met the 45-day criterion.



REPORT TIMELINESS

Final Report Lag Time 3rd Qtr CY97

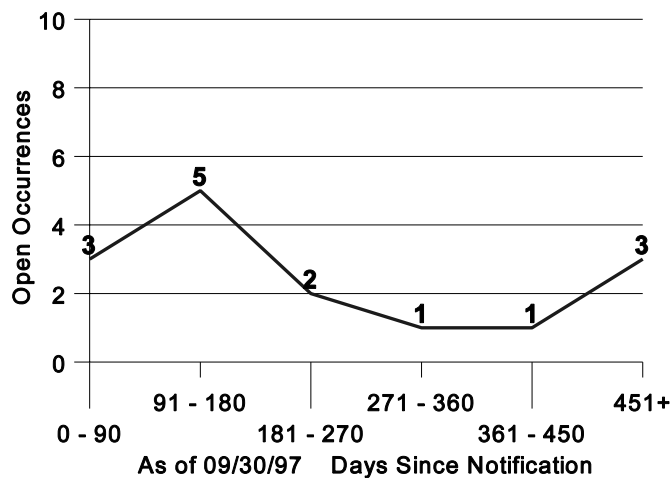
Days	0 - 15	16 - 30	31 - 45	46 - 60	61 - 75	76 - 90	90+
Reports	2	1	0	0	0	0	6

Backlog of Open Occurrence Reports

As of September 30, 1997, DOE/NV had fifteen open occurrence reports. Twelve reports have been open longer than 90 days. Three reports, still in the pre-final stage, have been open more than 500 days. DOE/HQ and DOE/NV each rejected one open occurrence report. These reports are awaiting further action. The remaining thirteen open occurrence reports are awaiting an update or pre-final action.

Age of Open Occurrence Reports

3rd Qtr CY97



ROOT CAUSE ANALYSIS

ROOT CAUSE ANALYSIS

Since the start of ORPS, DOE/NV has reported 670 root causes with the following distribution:

Management Problem at 26%, with the following subgroups identified (1) Inadequate Administrative Control and (2) Policy Not Adequately Defined, Disseminated, or Enforced.

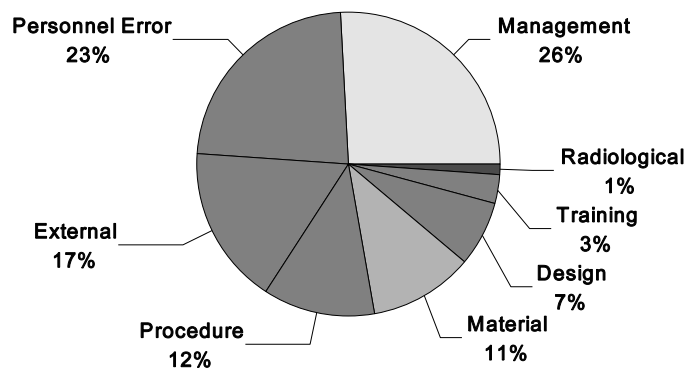
Personnel Error at 23%, with the following subgroups identified (1) Inattention to Detail, (2) Procedure Not Used or Used Incorrectly, and (3) Other Human Error.

External Phenomena at 17%, with the following subgroups identified (1) Weather or Ambient Condition and (2) Theft, Tampering, Sabotage, Vandalism.

The remaining root causes are Procedure Problem 12%, Equipment/Material 11%, Design Problem 7%, Training Deficiency 3%, and Radiological/Hazardous Material Problem 1%.

Root Cause

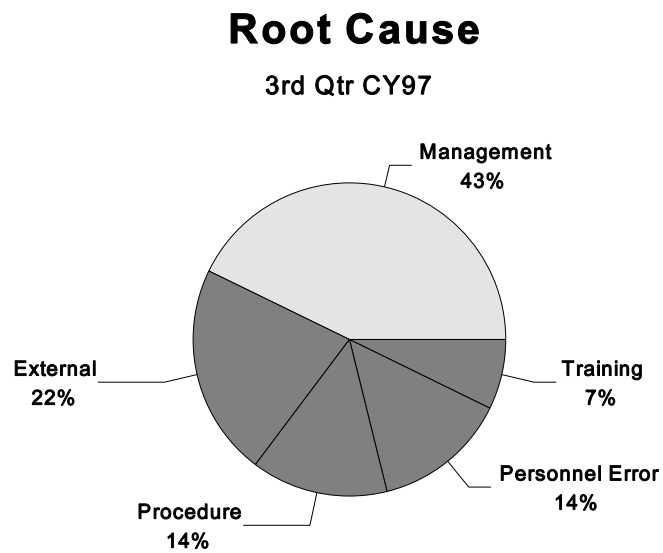
August 1, 1990 to September 30, 1997



ROOT CAUSE ANALYSIS

This quarter, DOE/NV reported fourteen root causes with the following distribution:

Management Problem 43%
External Phenomena 22%
Procedure Problem 14%
Personnel Error 14%
Training Deficiency 7%



ROOT CAUSE ANALYSIS

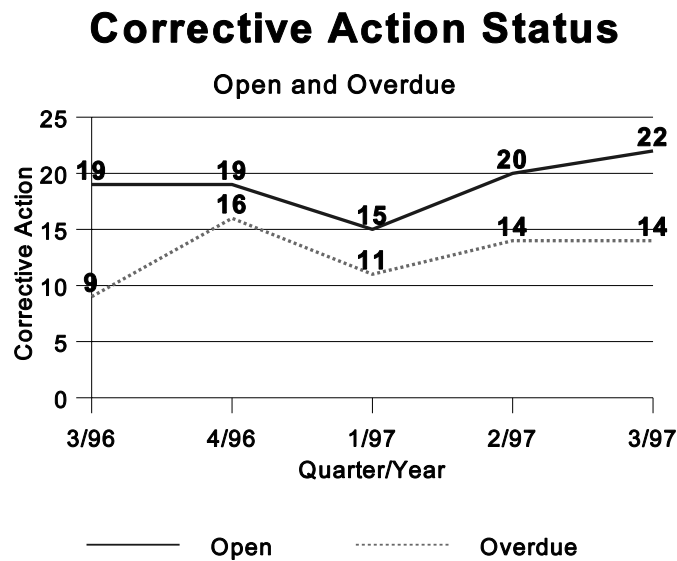
Root Cause Distribution Breakdown by Category

Root Cause	Total	Quarter
Equipment/Material	77	0
Procedure Problem	84	2
Personnel Error	151	2
Design Problem	50	0
Training Deficiency	17	1
Management Problem	174	6
External Phenomena	112	3
Radiological/Hazardous Material Problem	1	0
Other	4	0

ROOT CAUSE ANALYSIS

CORRECTIVE ACTIONS

As of September 30, 1997, DOE/NV had twenty-two open corrective actions. Fourteen of these are overdue. Note that because revised target completion dates are included each quarter, comparisons between quarterly corrective action status data are not meaningful. The distribution of actions changes whenever the status is updated.



DOE/NV OCCURRENCE REPORTS

DOE/NV OCCURRENCE REPORTS

excerpts from the occurrence reports residing in ORPS

DOE/NV categorized six events under ORPS for this quarter, three as UOs and three as ONs. Address any questions or comments to Deborah Binder at 295-6351 or the EOC personnel at 295-1422. An occurrence description for each event follows.

Occupational Injury, Severed Finger Tip (NVOO--BNLV-NTS-1997-0013)

On August 7, 1997, at 1450 hours, a Bechtel Nevada maintenance employee was repairing an evaporative cooler at Building CP-624, in Area 6. The wind caused the fan blade to rotate. The employee's left ring finger was caught between the pulley and belt severing the finger tip. The employee was transported to a hospital in Las Vegas, Nevada, and arrived at 1713 hours. The employee was hospitalized overnight following surgery for closure of the wound.

Water Line Leak (NVOO--BNLV-RSLO-1997-0003)

On July 28, 1997, at 0700 hours, the Photo Lab personnel informed the Remote Sensing Laboratory (RSL) facility maintenance that the lab had processed at least 40,000 gallons of water over the weekend. The Photo Lab personnel also informed RSL facility maintenance that water had entered below the ground pipe trench. An investigation was conducted and water was discovered entering the trench around the pipes located next to the door. Maintenance concluded that a 3-inch domestic water line was leaking under the floor in Room 1227A.

An emergency purchase requisition was created and a local contractor was called in to repair the problem. The contractor dug outside the facility near door XD8, where according to the building drawings, the water line was located. The pipe could not be found in this area. It was decided to dig by the underground valves and the pipe was located. Meanwhile, maintenance installed a temporary water bypass line to permit continued operation of the building chiller system.

During the next two days, the contractor installed a 2-inch bypass line that allowed maintenance to shut off the 3-inch line leaking under the slab. The remainder of the week was devoted to a permanent fix by replacing both the leaking 3-inch pipe and the 2-inch temporary pipe and back filling holes and concreting.

DOE/NV OCCURRENCE REPORTS

Lathe Accident Resulting in Medical Trauma (NVOO--SDNL-TTRO-1997-0003)

On July 24, 1997, at approximately 1357 hours, an Operations and Maintenance employee received extensive injuries to his right hand and arm while performing work on a lathe. A fellow employee heard screaming and rushed to his aid. The individual had just turned off the lathe and was backing away from it when the fellow employee arrived. The individual asked to be taken to the medical facility that is across the street. The Tonopah Test Range (TTR) medic began to stabilize the patient by placing him on an ambulance stretcher in a shock position and then placed him in the rear of the TTR ambulance. The medic noticed a missing digit on his right hand and requested the retrieval of the digit. The amputated right digit was found and secured in ice packs for transport to the Nye Regional Hospital. The patient had an IV and oxygen administered in place and his right extremity placed in position of comfort with appropriate bandaging and cooling. While en route to the Nye Regional Hospital, appropriate medical protocols were initiated and followed. At 1442 hours, the ambulance arrived at the Nye Regional Hospital with the patient in stable condition. The attending physician was briefed on the patient's vital signs and history. The amputated digit was turned over to the physician.

Demonstration/Protest (NVOO--WSIN-NTS2-1997-0009)

On Wednesday, July 2, 1997, at approximately 0445 hours, three intruders were apprehended on the Nevada Test Site (NTS) near the U1a Ground Zero. The intruders illegally entered the NTS on bicycles. On site security personnel searched and transported them to the holding area. The arrested personnel claimed no affiliation with any particular demonstration/protest group. They carried clothing identifying themselves as Greenpeace, which is affiliated locally with the Shundahai Network. There were no apparent injuries to the intruders or security personnel during this incident.

On July 2, 1997, at approximately 0615 hours, there were six demonstrators/protestors at the entrance to the NTS near the cattle guard. At 0800 hours, 20 to 25 additional protestors arrived. The demonstration was passive in nature until 0826 hours when protestors jumped in front of a KT Services bus and brought the bus to a halt. Seven personnel were arrested in this separate incident including three protestors who affixed themselves to the chassis of the bus. The three protestors chained themselves around their necks to the underside of the bus. Security personnel cut them loose with bolt cutters. The KT Services bus crossed the cattle guard onto the NTS at 0841 hours.

DOE/NV OCCURRENCE REPORTS

There were two demonstrator injuries reported. Medics looked at the alleged injuries and treated them appropriately. One arrested demonstrator claimed a neck injury and was transported to Beatty, Nevada, via NTS ambulance. One security person was hit in the face about four times while arresting a demonstrator. Assault charges are pending.

All arrested personnel were cited and transported to Beatty, Nevada, for action as deemed appropriate by the Nye County Sheriff's Office. All but one of the ten personnel transported to Beatty, Nevada, were cited and released. One person was cited on an obstruction of justice charge and released pending a court date. All demonstrators departed the entrance to the NTS at 1050 hours.

Demonstration/Protest (NVOO--WSIN-NTS2-1997-0010)

On Sunday, August 10, 1997, at approximately 0530 hours, there were 64 demonstrators at the entrance to the NTS near the cattle guard. Ten protestors were with the Catholic Work Group and 54 protestors with the Nevada Desert Experience.

Two Catholic Work Group protestors were arrested for destruction of property. They cut approximately 1,300 feet of barbed wire fence along the southern boundary of the NTS. Both individuals were transported to Beatty, Nevada, by Nye County Sheriff Officers for disposition. The Catholic Work Group demonstrators departed the area at approximately 0745 hours.

There were 27 Nevada Desert Experience protestors arrested. They were cited and released by Nye County Sheriff Officers. The Nevada Desert Experience protestors departed the area at approximately 1045 hours.

The two arrested Catholic Work Group protestors were transported from Beatty, Nevada, to the Tonopah jail where they await arraignment. Both protestors are being charged with a gross misdemeanor (under \$5,000) for malicious destruction of property.

DOE/NV OCCURRENCE REPORTS

Demonstration/Protest (NVOO--WSIN-NTS2-1997-0011)

On Thursday, September 18, 1997, at approximately 0500 hours, one intruder was apprehended near U1a Ground Zero after illegally entering the NTS on foot. Security personnel searched him. The intruder was transported to the Nye County Sheriff's Office and later to Beatty, Nevada. He was carrying a back pack and a radio scanner. The intruder was associated with the Shundahai Network. There were no apparent injuries to the intruder or to any security personnel.

The intruder appeared before a Judge on September 18, 1997. He pled Not Guilty and was released pending a court date.

On September 18, 1997, at approximately 0640 hours, there were 19 demonstrators at the entrance to the NTS near the cattle guard. At 0645 hours, four protestors were arrested for attempting to lie down in front of vehicle traffic entering the NTS. At approximately 1000 hours, two additional protestors were arrested.

The demonstrators departed the area at 1045 hours. There were no reported injuries. The personnel arrested were cited and released.

NATURE OF OCCURRENCE

NATURE OF OCCURRENCE

Nature of Occurrence Codes

1	Facility Condition	6	Transportation
2	Environmental	7	Value Basis Reporting
3	Personnel Safety	8	Facility Status
4	Personnel Radiation Protection	9	Nuclear Explosive Safety
5	Safeguards and Security	10	Cross-Category

Items

NATURE OF OCCURRENCE DISTRIBUTION AUGUST 1, 1990 TO SEPTEMBER 30, 1997

Nature of Occurrence	1	2	3	4	5	6	7	8	9	10
Total	204	146	101	33	101	15	24	11	2	64
Quarter	0	0	2	0	3	0	1	0	0	0

BNLV NATURE OF OCCURRENCE

Nature of Occurrence	1	2	3	4	5	6	7	8	9	10
Total	9	6	4	4	3	4	2	0	0	2
Quarter	0	0	1	0	0	0	1	0	0	0

DSWA NATURE OF OCCURRENCE

Nature of Occurrence	1	2	3	4	5	6	7	8	9	10
Total	0	0	0	2	0	0	0	0	0	0
Quarter	0	0	0	0	0	0	0	0	0	0

NATURE OF OCCURRENCE

NATURE OF OCCURRENCE

Nature of Occurrence Codes

1	Facility Condition	6	Transportation
2	Environmental	7	Value Basis Reporting
3	Personnel Safety	8	Facility Status
4	Personnel Radiation Protection	9	Nuclear Explosive Safety
5	Safeguards and Security	10	Cross-Category

Items

GONV NATURE OF OCCURRENCE

Nature of Occurrence	1	2	3	4	5	6	7	8	9	10
Total	5	1	0	0	1	0	0	0	0	1
Quarter	0	0	0	0	0	0	0	0	0	0

ITNV NATURE OF OCCURRENCE

Nature of Occurrence	1	2	3	4	5	6	7	8	9	10
Total	0	1	0	0	0	0	0	0	0	0
Quarter	0	0	0	0	0	0	0	0	0	0

LANV NATURE OF OCCURRENCE

Nature of Occurrence	1	2	3	4	5	6	7	8	9	10
Total	5	0	1	0	0	0	0	0	0	2
Quarter	0	0	0	0	0	0	0	0	0	0

NATURE OF OCCURRENCE

NATURE OF OCCURRENCE

Nature of Occurrence Codes

1	Facility Condition	6	Transportation
2	Environmental	7	Value Basis Reporting
3	Personnel Safety	8	Facility Status
4	Personnel Radiation Protection	9	Nuclear Explosive Safety
5	Safeguards and Security	10	Cross-Category

Items

LLNV NATURE OF OCCURRENCE

Nature of Occurrence	1	2	3	4	5	6	7	8	9	10
Total	2	0	2	3	0	1	1	1	0	2
Quarter	0	0	0	0	0	0	0	0	0	0

SDNL NATURE OF OCCURRENCE

Nature of Occurrence	1	2	3	4	5	6	7	8	9	10
Total	0	3	3	0	0	0	0	0	0	1
Quarter	0	0	1	0	0	0	0	0	0	0

WSIN NATURE OF OCCURRENCE

Nature of Occurrence	1	2	3	4	5	6	7	8	9	10
Total	1	0	16	0	45	0	2	0	2	2
Quarter	0	0	0	0	3	0	0	0	0	0

ROOT CAUSE CODES AND DEFINITIONS

ROOT CAUSE CODES AND DEFINITIONS

Equipment/Material Problem: An event or condition resulting from the failure, malfunction, or deterioration of equipment or parts, including instruments or material.

- 1A. **Defective or Failed Part:** A part/instrument that lacks something essential to perform its intended function.
 - 1B. **Defective or Failed Material:** A material defect or failure.
 - 1C. **Defective Weld, Braze, or Soldered Joint:** A specific weld/joint defect or failure.
 - 1D. **Error by Manufacturer in Shipping or Marking:** An error by the manufacturer or supplier in the shipping or marking of equipment.
 - 1E. **Electrical or Instrument Noise:** An unwanted signal or disturbance that interferes with the operation of equipment.
 - 1F. **Contaminant:** Failure or degradation due to radiation damage or foreign material such as dirt, crud, or impurities.
 - 1G. **End of Life Failure:** A failure where the equipment or material is run to failure and has reached its end of design life.
1. Equipment/Material Problems reported prior to 4/1/91.

EQUIPMENT/MATERIAL PROBLEM

Root Cause Code	1A	1B	1C	1D	1E	1F	1G	1
Total	45	22	0	3	0	6	0	1
Quarter	0	0	0	0	0	0	0	0

ROOT CAUSE CODES AND DEFINITIONS

Procedure Problem: An event or condition that can be traced to the lack of a procedure, an error in a procedure, or a procedural deficiency or inadequacy.

- 2A. **Defective or Inadequate Procedure:** A procedure that either contains an error or lacks something essential to the successful performance of the activity.
- 2B. **Lack of Procedure:** No written procedure was in place to perform the activity.
- 2. Procedure Problems reported prior to 4/1/91.

PROCEDURE PROBLEM

Root Cause Code	2A	2B	2
Total	38	44	2
Quarter	1	1	0

ROOT CAUSE CODES AND DEFINITIONS

Personnel Error: An event or condition due to an error, mistake, or oversight.

- 3A. **Inattention to Detail:** Inadequate attention to the specific details of the task.
 - 3B. **Procedure Not Used or Used Incorrectly:** The failure to use or the inappropriate use of written instructions, procedures, or other documentation.
 - 3C. **Communication Problem:** Inadequate presentation or exchange of information.
 - 3D. **Other Human Error:** Human error other than those described above.
3. Personnel Errors reported prior to 4/1/91.

PERSONNEL ERROR

Root Cause Code	3A	3B	3C	3D	3
Total	55	46	6	34	10
Quarter	0	1	0	1	0

ROOT CAUSE CODES AND DEFINITIONS

Design Problem: An event or condition that can be traced to a defect in design or other factors related to configuration, engineering, layout, tolerances, calculations, etc.

- 4A. **Inadequate Work Environment:** Inadequate design of equipment used to communicate information from the facility to a person (e.g., displays, labels, etc.) as well as inadequate work environment, such as inadequate lighting, working space, or other human factor considerations.
 - 4B. **Inadequate or Defective Design:** A design in which something essential was lacking (defective) or when a detail was included but was not adequate for the requirement (inadequate).
 - 4C. **Error in Equipment or Material Selection:** A mistake in the equipment or material selection only, not to include a procurement error (see Personnel Error (d) Other Human Error) or a specification error (see Design Problem - (d) Drawing, Specification, or Data Errors).
 - 4D. **Drawing, Specification, or Data Errors:** An error in the calculation, information, or specification of a design.
- 4 . Design Problems reported prior to 4/1/91.

DESIGN PROBLEM

Root Cause Code	4A	4B	4C	4D	4
Total	3	37	9	0	1
Quarter	0	0	0	0	0

ROOT CAUSE CODES AND DEFINITIONS

Training Deficiency: An event or condition that can be traced to a lack of training or insufficient training to enable a person to perform a desired task adequately.

- 5A. **No Training Provided:** A lack of appropriate training.
 - 5B. **Insufficient Practice or Hands-On Experience:** An inadequate amount of preparation before performing the activity.
 - 5C. **Inadequate Content:** The knowledge and skills required to perform the task or job were not identified.
 - 5D. **Insufficient Refresher Training:** The frequency of refresher training was not sufficient to maintain the required knowledge and skills.
 - 5E. **Inadequate Presentation or Materials:** The training presentation or materials were insufficient to provide adequate instruction.
5. Training Deficiencies reported prior to 4/1/91.

TRAINING DEFICIENCY

Root Cause Code	5A	5B	5C	5D	5E	5
Total	2	3	2	4	1	5
Quarter	1	0	0	0	0	0

ROOT CAUSE CODES AND DEFINITIONS

Management Problem: An event or condition that can be directly traced to managerial actions or methods.

- 6A. **Inadequate Administrative Control:** A deficiency in the controls in place to administer and direct activities.
 - 6B. **Work Organization/Planning Deficiency:** A deficiency in the planning, scoping, assignment, or scheduling of work.
 - 6C. **Inadequate Supervision:** Inadequate techniques used to direct workers in the accomplishment of tasks.
 - 6D. **Improper Resource Allocation:** Improper personnel or material allocation resulting in the inability to successfully perform assigned tasks.
 - 6E. **Policy Not Adequately Defined, Disseminated, or Enforced:** Inadequate description, distribution, or enforcement of policies and expectations.
 - 6F. **Other Management Problem:** A management problem other than those defined above.
6. Management Problems reported prior to 4/1/91.

MANAGEMENT PROBLEM

Root Cause Code	6A	6B	6C	6D	6E	6F	6
Total	52	30	15	3	38	34	2
Quarter	3	1	0	0	1	1	0

ROOT CAUSE CODES AND DEFINITIONS

External Phenomena: An event or condition caused by factors that are not under the control of the reporting organization or the suppliers of the failed equipment or service.

- 7A. **Weather or Ambient Condition:** Unusual weather or ambient conditions, including hurricanes, tornadoes, flooding, earthquake, and lightning.
- 7B. **Power Failure or Transient:** Special cases of power loss that are attributable to outside supplied power.
- 7C. **External Fire or Explosion:** An external fire, explosion, or implosion.
- 7D. **Theft, Tampering, Sabotage, or Vandalism:** Theft, tampering, sabotage, or vandalism that could not have been prevented by the reporting organization.

EXTERNAL PHENOMENA

Root Cause Code	7A	7B	7C	7D
Total	55	13	1	43
Quarter	3	0	0	0

ROOT CAUSE CODES AND DEFINITIONS

Radiological/Hazardous Material Problem: An event related to radiological or hazardous material contamination that cannot be attributed to any of the other causes.

8A. **Legacy Contamination:** Radiological or hazardous material contamination attributed to past practices.

8B. **Source Unknown:** Radiological or hazardous material contamination where the source cannot be reasonably determined.

RADIOLOGICAL/HAZARDOUS MATERIAL PROBLEM

Root Cause Code	8A	8B
Total	1	0
Quarter	0	0

Other: Other problems reported prior to 4/1/91.

OTHER

Root Cause Code	9
Total	4
Quarter	0

LESSONS LEARNED

LESSONS LEARNED

excerpts from the DOE Lessons Learned Information Services

The following section discusses selected final reports that go beyond the minimum requirements of DOE Order 232.1 in providing lessons learned worth distributing to the DOE community.

Death From Dimethyl Mercury Poisoning

Lessons Learned: Latex rubber gloves do not provide sufficient protection against exposure to some toxic compounds such as dimethyl mercury.

Discussion: During research activities, a Dartmouth College scientist was exposed to as little as a drop of dimethyl mercury in August 1996. The scientist did not show symptoms (loss of balance, trouble speaking) until January 1997, when she was diagnosed with mercury poisoning, went into a coma three weeks later, and died in June 1997. Hospital tests showed 80 times the lethal dose of mercury in her blood. The compound is attracted to the oil in human skin and is readily absorbed by the body.

Glove tests by an independent laboratory showed that the rare compound can pass through rubber latex gloves quickly, and usually without damaging the gloves. This finding shocked other scientists in the field as it was believed that the rubber latex gloves provided the required protection.

Recommended Actions: The following recommended actions were published in a newsletter of the American Chemical Society (May 1997): when working with dimethyl mercury, wear neoprene gloves with long cuffs and have blood and urine tested frequently.

Failure to Recognize Changed Conditions Leads to Injury and Contamination

Lessons Learned: Hazard analysis must be an ongoing process that continues throughout the duration of a project. Supervisors and workers must recognize changes in job scope, work practices, methods, or operating conditions. Such information must be communicated to safety and health personnel for reevaluation to decide whether new or modified controls will be necessary. Work plans or activity hazard analyses should contain provisions to suspend work under such conditions.

Discussion: A project to install a waste collection tank involved removal of several liquid low-level waste and process pipe lines. Initial work plans were for the lines to be cut by use of a remotely-operated saw inside a glove-bag; the entire operation was to

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be done inside a HEPA-filtered enclosure. During preparatory excavation, an unexpected drain line was found. The project team identified that the additional line was from a facility that handled alpha-emitting radionuclides and was not a typical low-level waste line. A subsequent decision, based on the configuration of the work area, was made to excavate around the pipes and cut them with a portable band saw rather than a remotely-operated saw; the changed method did not require use of a glove-bag.

During cutting activities, ground water seeped into the excavation and the walking surfaces became covered with slippery mud. A worker began performing a cut on the waste line when the saw blade slipped off the saw body and became stuck in the pipe. The worker tried to free the saw, slipped in the mud, and cut a finger on the contaminated saw blade and received an injection of radiological material.

Analysis: There were three aspects of this incident associated with less than adequate recognition and characterization of hazards.

- (1) Changes in job scope may impact characterization data. The decision to include another drain line in the project scope also introduced additional characterization data. If this information had been adequately communicated to appropriate project personnel, it could have been considered in selection of work methods and in development of more appropriate radiological work controls.
- (2) Changes in work methods and/or practices may present different hazards. The change in work methods, using a hand-held portable band saw instead of a remotely-operated saw, was not communicated to safety and health personnel for reevaluation of hazards and controls. Had this exchange of information occurred, more appropriate personal protective clothing could have been specified, such as leather gloves for working with a saw.
- (3) Changes in local working conditions may introduce new hazards. Water seeped into the work area and created slippery walking and working conditions. This new condition was not recognized as a hazard by the workers. Had this change been recognized and communicated to their supervisor, absorbent material could have been used to improve the situation or more appropriate footwear could have been selected for the workers.

Recommended Actions: Workers and supervisors should be reminded to be aware of changes in the job scope, work methods, or work conditions. Workers and supervisors should exchange such information between themselves and with other key project personnel. If necessary, work on impacted activities should be suspended until a hazard reevaluation is completed.

LESSONS LEARNED

Unposted High Radiation Area Identified on Hot Cells Rooftop

Lessons Learned: All facilities in which radioactive materials are handled or exposed in a manner that creates radiation fields should be thoroughly mapped by means of radiological surveys to ensure that radiological postings and controls are adequate. Whenever radiological materials handling procedures are modified, actual and potential radiation fields should be evaluated to decide if existing controls remain adequate.

Discussion: During a transfer operation to move radioactive targets from a shipping cask to a dispensary cell in a hot cell array, a radiological control technician (RCT) identified a high radiation area on the roof above the hot cells. Rooftop measurements exceeded 5 rem per hour during the transfer operation. The RCT received a 110-millirem dose during the 10 seconds or so that she was exposed to the high radiation field. The RCT, who had been performing the rooftop surveys as part of the site's ongoing effort to radiologically characterize the hot cell facility, immediately left the area when her instrumentation alarmed at full scale.

The rooftop was posted, all access paths were controlled, and all site personnel who performed work that would require access to the roof were removed from the site's badge reader database to prevent them from coming onsite without first checking with the access controller. Under the direction of the facility manager, health physics personnel surveyed the entire technical area for additional unidentified radiation areas; none were found. Personnel also verified that no unexplained radiological exposure incidents had occurred over the past few years that involved work on the hot cell rooftop.

A radiological map of the roof was developed, and investigators determined that the hot cells in the u-shaped cell array were fully shielded but the warm corridor roof between the cells was not shielded. Additionally, the user group had modified the transfer procedure in the late 1980s after determining that the dispensary cell crane used to transfer targets from the warm corridor into the cell was underrated. They began using a 6-ton crane to place the targets next to the dispensary cell. A 2-ton crane was used to lift off the shipping cask lids, with the targets attached, and place it in the cell. The high-radiation was created during the time in which the targets were lifted out of the casks and not yet in the cell. Although crane safety considerations were thoroughly evaluated before the transfer procedure was modified, changes in the radiation fields generated by the targets were overlooked.

Recommended Actions: To ensure that future transfer operations adequately address potential radiation streaming, an access control procedure was developed that includes communications, posting, barrier, sweep, and surveillance requirements. Checklists were also developed for the posting and area sweep requirements. The procedure is

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flexible in that it takes into account the various types of targets handled at the facility, and the requirements vary according to the type of radiation field that may potentially be generated. To ensure positive access control on the rooftop, fences will be installed on the rooftop in potential high-radiation areas, and flashing beacons will be installed that will be automatically triggered when the kirk key system on the dispensary cell is accessed to open the cell door. A warning horn will also sound each time the beacons are activated.

Refrigerated Flammable/Combustible Liquid Storage

Lessons Learned: Flammable/Combustible liquids stored in refrigerated rooms require safeguards comparable to those stored in flammable liquid storage cabinets or designated storage rooms.

Discussion: During an assessment of Building 9202, several deficiencies were identified concerning a refrigerated room designated for the storage of flammable/combustible liquids. The following deficiencies were identified:

- (1) Two containers identified as oxidizers were stored within the room.
- (2) Several containers were not properly labeled.
- (3) A pump and funnel were noted indicating dispensing in the room which is not approved for dispensing.
- (4) The lack of a containment dike in the room was noted.

Analysis:

- (1) Oxidizers are not to be stored near flammable/combustible liquids. One of the very basic requirements in keeping the storage of flammable/combustible liquids safe is to separate their storage from incompatible materials. The hazards of stored oxidizers can manifest themselves in one or more of the five distinct hazardous situations as follow:
 - (a) They increase the burning rate of combustible materials.
 - (b) They can cause spontaneous ignition of combustible materials.
 - (c) They can decompose rapidly.
 - (d) They can liberate hazardous gases.
 - (e) They can undergo self-sustained decomposition, which can result in an explosion.
- (2) Containers of materials are required to be labeled. This is a basic requirement of Plant Procedures concerning flammable/combustible liquid storage, other chemical storage, and Hazard Communications.

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- (3) Dispensing (transferring of the liquid from one container to another) of flammable/combustible liquids is inherently hazardous. If the liquid is allowed to free fall, it can build its own static charge and ignite. If it is pumped with unapproved equipment, a hazardous situation can also result. Dispensing of flammable/combustible liquids requires approved equipment, grounding, bonding, and an approved location to perform the activity.
- (4) The storage of flammable/combustible liquids requires containment. If a fire were to occur, when the liquid was released from its container, the burning liquid could travel both horizontally and vertically, spreading the fire to additional areas. Even without a fire, the liquid could continue to spread until the vapors found an ignition source. Containment is required for refrigerated rooms storing flammable/combustible liquids.

Besides complying with the requirements for general flammable/combustible liquid storage, coolers and refrigerators for flammable/combustible liquid storage are required to be UL-Listed/FM-Approved for the application or otherwise approved for use by Fire Protection Engineering.

Recommended Actions: Review all coolers and refrigerators used to store flammable/combustible liquids to ensure materials are properly stored.

Nitric Acid Causes Drum Over-Pressurization

Lessons Learned: Closed or sealed containers, such as a 55-gallon drum, should not be used for the disposal of organic material in combination with nitric acid. Storing organic material soaked with nitric acid in a closed container may generate gases that may lead to a build up in pressure, possibly resulting in an unexpected blow-off of the container lid or blowout of the container walls.

Discussion: On June 2, 1997, a drum of nitric acid in Building 9720-31 was discovered leaking. Solid wastes (paper towels, diapers, saranex suits, rubber gloves, leather gloves, respirators/cartridges, and plastic bags) used in a spill cleanup were placed in a lined open top drum. The lid was sealed and the drum placed alone in Room 6 of Building 9720-31.

On June 3, 1997, two facility technicians discovered that the lid of the same drum appeared to have blown off. The lid hit an overhead sprinkler system bending the piping and dislodging piping fasteners. Pieces of the drum contents were ejected from the drum and strewn about the storage area. Overpressurization is suspected to have caused the drum lid to come loose.

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No personal injuries occurred. The incident was reported to the Y-12 Plant Shift Superintendent, Spill Response Coordinator, Fire Protection Engineering, Facility Safety, Development Division (chemical engineering), and Y-12 Fire Department.

Analysis: The probable cause of the overpressurization was the buildup of nitrous oxide gas resulting from the residual nitric acid oxidizing the organic materials present in the drum. The use of lids with a pressure relief device would have prevented this problem.

Recommended Actions: The ejected material and the remaining contents of the drum were placed in two new lined 55-gallon open top steel drums. Lids with open bung holes were not put in place until June 5, 1997, to ensure overpressurization did not occur.

Waste packaging requirements are being reviewed with all personnel involved with cleanup and packaging.

Hoist/Crane Preshift Inspection-Operator Aid

Lessons Learned: The use of a Hoist/Crane preshift checklist, attached to the crane or hoist pendants, helps ensure a proper preshift inspection.

Discussion: The Special Materials Organization (SMO) in Building 9204-2 utilizes an "operator aid" to ensure proper preshift inspection of cranes and hoists before use. The operator aid is a laminated card attached to each hoist or crane pendant. The card lists each item that should be inspected by the operator before use, and the necessary actions to report deficiencies. Operators have been instructed on the proper use of the operator aid. The operator aid eliminates the need for the hoist/crane operator to carry a checklist or other paperwork into the work area listing the inspection criteria.

The following are the items included on the checklist:

- (1) Check ET&I certification date or other applicable postings.
- (2) Check operator controls/mechanisms for proper operation, proper adjustment, unusual sounds, or excessive wear.
- (3) Check hoist upper and lower limit stops device (as applicable) within a load. Care should be exercised when hook/load blocks approach upper limits.
- (4) Check hoist braking system for proper operation. Hoist stops when required.
- (5) Check pendant and power cables for damage and air lines for leaks (as applicable).

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- (6) Check hooks for distortion, bent, twisted, increased throat opening, cracks, nicks, or gouges. If hook is equipped with latch, latch operates properly. Hook is securely attached to rope or chain.
- (7) Check rope for kinking, crushing, unstranding, birdcaging, main strand displacement, core protrusion, general corrosion, broken or cut strands.
- (8) Check ropes or chains for proper travel through blocks and guides. Rope lays smoothly on drum (if applicable).

Analysis: OSHA and DOE require that cranes/hoists be inspected before use, but it is not required that the inspection be documented. The operator aid provides an excellent reminder to operators of the items required to be inspected before use.

Recommended Actions: Organizations that use hoists, cranes, or lift trucks should consider using a laminated checklist similar to the one used by SMO as an operator aid to ensure proper inspections are performed.

Crane Outrigger Pad Falls and Damages Motor Vehicle

Lessons Learned: When transporting a crane, the manufacturer's requirements or recommendations must be followed. This includes removing or securing outrigger pads before transit. Instead of relevant instructions in the operator's manual, contact the manufacturer or a qualified person. Outrigger pads (floats) should normally be removed when the crane is traveling on any road.

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Discussion:

Summary: An outrigger pad fell off a crane in transit from the 300 area to the HAMMER facility. An automobile ran over the pad and was damaged.

Details: The HAMMER Project contracted Fluor Daniel Northwest (FDNW) Construction Forces to off load two conex boxes, measuring 40 feet by 8 feet. On July 24, 1997, an FDNW operator was moving a 20-ton Lorain Rough Terrain Crane 17-T-5689 from the 300 area to the new HAMMER facility along Horn Rapids Road. Upon arriving at the HAMMER facility, a premix truck driver advised the operator that the right rear outrigger pad was missing. While retracing the route on Horn Rapids Road, the operator encountered an automobile pulled over to the side of the road. The driver of the automobile informed the operator that he had run over the outrigger pad, damaging the stabilizer bar and fog light on the driver's side. The operator notified Hanford Patrol, who then contacted the Richland Police Department for assistance with the investigation.

Analysis: The crane's manufacturer (Koehring) does allow highway travel for this model crane. The Manufacturer's Operating Procedures state, "Though designated primarily for use in off-road conditions, there may be instances when highway travel is necessary." The operator's manual of this crane does not address stowing the outrigger pads, but when the manufacturer was contacted, a representative recommended stowing them during highway travel.

The loss of the outrigger pad was induced by excessive wear on the lip of the flip lock. The wear was caused by the outrigger pad swinging in the vertical outrigger ram over time. The swinging action resulted from traveling with the outrigger pads in place. As the crane was traveling on the road, the outrigger pad swung enough to make it over the worn flip lock lip and fall from the outrigger arm.

Recommended Actions: Outrigger pads should be removed before driving a crane in transit unless otherwise directed by the crane manufacturer. The pad retention mechanism should be inspected according to the manufacturer's instructions.

Incorrect Battery Installed in Backhoe Causes Small Fire

Lessons Learned: When replacing parts, components, fittings, etc., proper emphasis must be placed on ensuring that the correct replacement item is used according to the manufacturer's specifications. In this circumstance, a replacement battery meeting specification for current and voltage ratings was installed; however, the configuration of the battery terminals caused physical conflict with other components installed on the equipment.

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Discussion: A small fire occurred in the engine compartment of a 1984 Model 780B CASE Backhoe during operation of the backhoe. The fire was immediately extinguished by the operator using a portable fire extinguisher located on the equipment. The damage from the fire was limited to a battery, battery cable, and a hydraulic cooling line. There was no immediate danger to the operator or any other personnel on the worksite.

A hydraulic cooling hose connected to the bottom of the radiator was contacting a battery terminal post. The terminal post is on the center line of the battery and at a point where the hose turns down over the end of the battery. The position of the battery terminal and the hydraulic hose were in conflict for their intended functions. Through operation of the backhoe, the terminal post eventually wore through the rubber hose insulation and into the metal sheath on the hose. This contact caused the battery to become grounded and the fire resulted.

Analysis: Investigation revealed that the batteries on the backhoe were replaced approximately seven months before the incident occurred. Through contact with the manufacturer's Equipment Representative it was determined that an incorrect type of battery was reinstalled on the backhoe. The correct battery type has terminal posts on opposite sides of the top of the battery, not on the centerline of the battery. Installation of the correct type of battery would have precluded contact between the battery terminal and the hydraulic cooling hose.

Suspect/Counterfeit Wire Rope

Lessons Learned: Appropriate receipt inspections including the verification of required supporting documentation should be performed on equipment critical to safety or operations before service use.

Discussion: During Receipt Inspection stainless steel wire rope was found to lack the documentation required by the procurement specification.

WSRC Receipt Inspection contacted the supplier (a rigging equipment/material supplier) and requested supporting documentation to resolve the discrepant condition. The requested documentation was received from the supplier, but was incomplete per specification requirements.

WSRC Receipt Inspection then contacted the manufacturer cited on the test certificate to provide the required documentation. The manufacturer was unable to find the order from the information supplied and requested a copy of the test certificate. The manufacturer determined that the test certificate received from the supplier was altered and incorrect. Also, samples of the wire rope were sent to the manufacturer for

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inspection. Contrary to the test certificate provided by the supplier, the manufacturer determined that the wire rope was not their product as stated on the test certificate. The origin of the wire rope is currently unknown and the integrity is indeterminate.

Actions Taken:

- (1) A Quality Assurance Hold Tag was attached to the material.
- (2) The wire rope was segregated and a Nonconformance Report was initiated to control the material.
- (3) A site-wide search was initiated to find wire rope furnished by the same supplier.
- (4) Effective immediately, all hoisting and rigging equipment have been reduced to 50 percent of the rated capacity until wire rope procurement documentation has been evaluated.
- (5) WSRC General Counsel has been notified and in turn will notify the Office of Inspector General.
- (6) An occurrence report (SR--WSRC-CMD-1997-0014) has been written.
- (7) The DOE complex was notified.
- (8) Actions to decide the scope/impact of this incident are continuing.

Recommended Actions: Facilities should review their procurement procedures to ensure that appropriate measures are in place for the quality verification of attributes specified in purchase orders. Facilities should ensure that necessary supporting documentation is supplied with rigging materials/equipment.